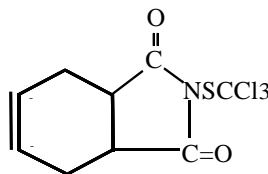


CAPTAN

Captan is a federal hazardous air pollutant and was identified as a toxic air contaminant in April 1993 under AB 2728.

CAS Registry Number: 133-06-2

Molecular Formula: $C_9H_8Cl_3NO_2S$



Captan occurs as odorless white to cream powder crystals. It is practically insoluble in water, partially soluble in acetone, benzene and toluene, and slightly soluble in ethylene dichloride and chloroform (Merck, 1983; Sax, 1987).

Physical Properties of Captan

Synonyms: 3a,4,7,7a-tetrahydro-2-[(trichloromethylthio)-1H-isoindole-1,3(2H)-dione;
n-(trichloromethyl-thio)-4-cyclohexene-1,2-dicarboximide;
n-(1,1,2,2-tetrachloroethylmercapto)-4-cyclohexene-1,2-dicarboximide;
n-(1,1,2,2-tetrachloroethylsulfenyl)- cis-4-cyclohexene-1,2-dicarboximide; Difolatan

Molecular Weight:	300.57
Melting Point:	178 °C
Density/Specific Gravity:	1.74 at 25/4 °C (water = 1)
Vapor Pressure:	7.5×10^{-6} mm Hg at 20 °C
Log Octanol/Water Partition Coefficient:	2.35
Water Solubility:	0.5 mg/l at 20 °C
Henry's Law Constant:	5.9×10^{-6} atm-m ³ /mole
Conversion Factor:	1 ppm = 12.3 mg/m ³

(Howard, 1990; HSDB, 1991; Merck, 1983; U.S. EPA, 1994a)

SOURCES AND EMISSIONS

A. Sources

Captan is registered by the Department of Pesticide Regulation (DPR) as a fungicide, and is used to prevent and control fungal diseases. It is registered for use in soil applications prior to planting, as a seed treatment on a variety of crops, and as a pre-plant root dip on peaches, azaleas, rhododendrons and many other ornamental shrubs and trees. It is also registered for use on citrus, stone and pome fruits, strawberries, grapes, roses, ornamental plants, and turf (DPR, 1996).

The licensing and regulation of pesticides for sale and use in California are the responsibility of DPR. Information presented in this fact sheet regarding the permitted pesticidal uses of captan has been collected from pesticide labels registered for use in California and from DPR's pesticide databases. This information reflects pesticide use and permitted uses in California as of October 15, 1996. For further information regarding the pesticidal uses of this compound, please contact the Pesticide Registration Branch of DPR (DPR, 1996).

Captan is used industrially for incorporation into lacquers, oil-based paints, paper, paste (wallpaper flour), plasticizers, polyethylene (garbage bags and pond liners), rubber stabilizer, textiles, vinyl, and vinyl resins (HSDB, 1991).

B. Emissions

No emissions of captan from stationary sources in California were reported, based on data obtained from the Air Toxics "Hot Spots" Program (AB 2588) (ARB, 1997b).

C. Natural Occurrence

No information about the natural occurrence of captan was found in the readily-available literature.

AMBIENT CONCENTRATIONS

The Air Resources Board (ARB) conducted a four-week monitoring program in May and June of 1993 for captan and its breakdown product tetrahydrophthalimide (THPI) in an area of expected high use. Monitoring was conducted in Kern County to coincide with captan applications to grapes as a fungicide. All samples collected were below the detection limits for captan and THPI of 0.25 micrograms per sample ($\mu\text{g}/\text{sample}$) and $0.5 \mu\text{g}/\text{sample}$, respectively. The ARB also conducted a three-day ambient air monitoring program in Tulare County in the Spring of 1993 during and following a ground application to a vineyard, with an application rate of 3.89 pounds of captan per acre. The concentrations of captan detected varied from 0.03 to 0.47 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) or 0.002 to 0.038 parts per billion (ppb), with no THPI found above the minimum detection limit. Three of four samples with captan values above the detection limit were those sampled during the application (ARB, 1994a).

Captan was qualitatively detected in five indoor and two outdoor air samples of a total of nine household ambient air samples collected from southeastern U.S. in 1985. The indoor concentration of captan in one of the households ranged from 0.037 to $0.072 \mu\text{g}/\text{m}^3$ (0.003 to 0.006 ppb). Captan concentrations in a strawberry field 2 hours, 7 hours, 3 days, and 14 days after application were 1.02, 0.89, 0.72, and $0.38 \mu\text{g}/\text{m}^3$ (0.08, 0.07, 0.06, and 0.03 ppb), respectively. The application rate was 2.2 pounds of active ingredient per acre (Howard, 1990).

INDOOR SOURCES AND CONCENTRATIONS

According to the Nonoccupational Pesticide Exposure Study conducted by the United States Environmental Protection Agency (U.S. EPA) and published in January 1990, levels of 32 pesticides were measured in 24-hour samples obtained inside and outside homes located in two cities. Approximately 70 homes in Jacksonville, Florida were monitored in each of three seasons, and approximately 50 homes in Springfield/Chicopee, Massachusetts were monitored in each of two seasons. Mean indoor concentrations of captan ranged from 0.1 to 2.2 nanograms per cubic meter in Springfield/Chicopee. For both cities, average indoor captan concentrations were higher than corresponding outdoor concentrations (Immerman and Schaum, 1990).

ATMOSPHERIC PERSISTENCE

Captan may enter the atmosphere as a particle or vapor (Howard, 1990). No information about the atmospheric half-life or lifetime of captan was found in the readily-available literature.

AB 2588 RISK ASSESSMENT INFORMATION

Captan emissions are not reported from stationary sources in California under the AB 2588 program. It is also not listed in the California Air Pollution Control Officers Association Air Toxics "Hot Spots" Program Revised 1992 Risk Assessment Guidelines as having health values (cancer or non-cancer) for use in risk assessments (CAPCOA, 1993).

HEALTH EFFECTS

Probable routes of human exposure to captan are inhalation, ingestion, and dermal contact (Sittig, 1991).

Non-Cancer: Dermal exposure to captan may cause skin and eye irritation in humans. Ingestion of large quantities of captan may cause vomiting and diarrhea (U.S. EPA, 1994a).

The U.S. EPA has calculated an oral Reference Dose (RfD) of 0.13 milligrams per kilogram per day based on decreased mean body weights in rats. The U.S. EPA estimates that consumption of this dose or less, over a lifetime, would not likely result in the occurrence of chronic, non-cancer effects. The U.S. EPA has the Reference Concentration (RfC) under review (U.S. EPA, 1994a).

Little information on adverse human reproductive effects of captan is available. Evidence on adverse reproductive and developmental effects of captan in animals is conflicting. In one study where animals were orally exposed, captan was fetotoxic in high-dosed rabbits, a slight reduction in fetal weight was observed in high-dosed rats, and increased resorptions were observed in high-dosed hamsters. Some abnormalities were observed in another study, while other studies have reported no effects (U.S. EPA, 1994a).

Cancer: No information is available on the carcinogenic effects of captan in humans. One strain of mice orally exposed to captan reportedly developed tumors of the duodenum. The U.S. EPA has classified captan in Group B2: Probable human carcinogen (U.S. EPA, 1994a). The International Agency for Research on Cancer has classified captan in Group 3: Not classifiable as a carcinogen (IARC. 1987a).

The State of California has determined under Proposition 65 that captan is a carcinogen (CCR, 1996). The inhalation potency factor that has been used as a basis for regulatory action in California is 6.6×10^{-7} (microgram per cubic meter)⁻¹ (OEHHA, 1994). In other words, the potential excess cancer risk for a person exposed over a lifetime to $1 \mu\text{g}/\text{m}^3$ of captan is estimated to be no greater than 0.66 in 1 million. The oral potency factor that has been used as a basis for regulatory action in California is 2.3×10^{-3} (milligram per kilogram per day)⁻¹ (OEHHA, 1994).